Landscape Architecture Program (LAP) Research Program Strategic Plan and Gap Analysis

Purpose: The strategic research plan is a tool that articulates the role of research and its value in the LAP. It is a dynamic document that can be updated and changed as research needs evolve. By highlighting research priorities and identifying research gaps, the plan promotes an efficient and effective research process.

Caltrans
Mission: Caltrans improves mobility across California

LAP Research Program
Purpose: Advance landscape architectural practice and knowledge by researching and implementing state-of-the-art technologies and methodologies that balance mobility, safety and maintainability with economic needs, adjacent land use and aesthetic, environmental, scenic and community values.

Roadside Management

Goal: Develop standards and guidelines that improve the cost, efficiency and safety of ecologically-based sustainable roadside management practices

Erosion Control & Storm Water Pollution Prevention
Goal: Protect roadsides and improve storm water quality

Potential Funding Sources: A, B, C

Climate Change
Goal: Develop adaptation strategies to protect roadside infrastructure from the effects of climate chage.

Potential Funding Sources: A, B, C

Soils
Goal: Protect and improve soil resources

Potential Funding Sources: A, B

Weed and Pest Control
Goal: Develop integrated best practices to prevent and control invasive and noxious species

Potential Funding Sources: B, C, F

Landscape Maintenance
Goal: Protect California's infrastructure investment and maximize maintenance efficiencies

Potential Funding Sources: B, C, F

Design

Goal: Promote excellence in multi-modal transportation design that improves safety, mobility, economics and maintenance

Context Sensitive Solutions
Goal: Protect and enhance the environment and quality of life through a collaborative approach involving all stakeholders.

Potential Funding Sources: B, C, D

Aesthetic Values
Goal: Protect and improve aesthetic values visible from and to transportation facilities

Potential Funding Sources: B, C

Safety
Goal: Improve traveler and worker safety through design

Potential Funding Sources: B, C, D

Landscape

Goal: Promote environmental stewardship of the natural and constructed roadside

Highway Planting
Goal: Improve planting and revegetation success

Potential Funding Sources: A, C

Irrigation
Goal: Conserve water and reduce irrigation life-cycle costs

Potential Funding Sources: D

Landscape Construction
Goal: Improve landscape construction methods

Potential Funding Sources: D, E

Key
Potential Funding Sources:
A- Caltrans Division of Environmental Analysis, Stormwater Program
B- Caltrans Division of Research and Innovation
C- National Cooperative Highway Research Program
D- Caltrans Division of Design, Landscape Architecture Program
E- Caltrans Division of Construction
F- Caltrans Division of Maintenance

See page 5 for funding cycles dates

Roadside Management

01/13/10

LAP Research Projects

Erosion Control and Stormwater Pollution Prevention

Goal: Protect roadsides and improve storm water quality

Objectives

1. Control roadside erosion and slope failures
2. Reduce discharge of pollutants to storm drainage systems
3. Comply with permit requirements
4. Improve soil structure
5. Integrate context sensitive stormwater treatment facilities
6. Treat stormwater runoff

Priority	Objective	Research Project
	1, 2	Arid Region Non-Vegetative Permanent Erosion Control, 2010
	1, 2, 3, 4, 6	Install and Monitor Ornamental Biostrips and Bioswales for Stormwater Treatment, 2010
	1, 2, 3	Roadside Erosion Control Management Study, RECM, 2010
	1, 2, 3, 4, 6	Compost for Erosion Control and Stormwater Treatment, 2009
	1, 2, 3	Evaluation Of Erosion Control Test Trials, Lake Tahoe, 2008
	1, 2, 3, 4, 6	Using Native Grass Sod for Biostrips & Bioswales, 2008
	1, 2, 3, 4, 6	Scoping and Siting of Ornamental Biostrips and Bioswales for Stormwater Treatment, 2008
	1, 2, 3	Seed Specification and Plant Calculator Tool, 2008
	1, 2, 3	Roadside Erosion Control Management Study, RECM, 2008
	1, 2, 3, 4	Highway 46 Demonstration Project, Bolander,2007
	1, 2, 3, 4	Performance of Erosion Control Treatments on Reapplied Topsoil, 2005
	1, 2, 3	Vegetation Establishment & Maintenance Study, VEMS, 2005
	1, 2, 3, 4	The Use of Mycorrhizal Fungi in Erosion Control Applications, 2004
	1, 2, 3, 4	Effective Planting Techniques to Minimize Erosion, 2004
	1, 2, 3	Hydraulic Application Study, 2002
	1, 2, 3	Vegetation Establishment for Erosion Control under Simulated Rainfall, 2002
	1, 2, 3, 4	Rainfall Simulation: Evaluating Hydroseeding & Plug Planting for Erosion Control. & Improved Water Quality, 2002
	1, 2, 3	District 5 Advisory Guide to Plant Species Selection of Erosion Control, 2001
H	5	Submitted 2010 NCHRP, Caltrans Green Infrastructure
H	5	Submitted 2010 NCHRP, Roadside Sustainability Synthesis Study
H	6	Infiltration Study, (2007 TAP)
H	6	Low Impact Development strategies (2008 LAP)
M	4, 6	Evaluate water quality runoff from compost and organic fertilizer (2008 idea from Dave Yam)
M	4	Best practices to manage stockpiled wetland soil (2008 idea from D. Reeves)

Landscape Maintenance

Goal: Protect California's infrastructure investment and maximize maintenance efficiencies

Objectives

1. Enhance revegetation and sustain highway planting
2. Reduce cost and frequency of maintenance activities
3. Improve worker safety
4. Minimize road closures
5. Preserve habitat
6. Reduce roadside trash
7. Graffiti abatement

Priority	Objective	Research Project
L	1, 2, 3	Best Practices of Mowing (2007 TAP)
L	1, 3, 6, 7	Effective Public Education on Litter (2007 TAP)
M	2, 3, 6	Best Practices for Effective Litter Pick-Up (2007 TAP)
M	2, 3, 6	Development of a Trash Fence (2007 TAP)

Soils

Goal: Protect and improve soil resources

Objectives

1. Improve soil quality to promote revegetation
2. Establish desirable vegetation in the R/W
3. Improve soil evaluation practices

Priority	Objective	Research Project
	1, 2, 3, 4	Soils Resource Evaluation, II, 2008
	1, 2, 3	Use of Native Plants and Mycorrhizal Fungi for Slope Stabilization, 2008
	1, 2, 3, 4	Soils Resource Evaluation, I, 2005
	1, 2, 3	Use of Organic Amendments for Revegetation of Disturbed Sites with Adverse Soil Conditions, 2005
	1, 2	The Use of Mycorrhizal Fungi in Erosion Control Applications, 2004
	1, 2	The Effects of Topsoil Reapplication on Vegetation Reestablishment, 1994
H	3	Improve Soil Evaluation Practices

Weed and Pest Control

Goal: Develop integrated best practices to prevent and control invasive and noxious species

Objectives

1. Identify and control noxious weeds
2. Reduce herbicide use
3. Reduce recurrent maintenance activities
4. Preserve habitat
5. Develop stakeholder partnerships
6. Control unwanted vegetation
7. Minimize fire hazards
8. Preserve roadside native plants

Priority	Objective	Research Project
	1, 2, 3, 6, 7	Paving Under Guardrail Crash Testing, 2009
	1, 2, 3, 4, 6, 8	Vegetation Conversion to Desirable Species, II, 2007
	1, 2, 3, 4, 6, 7	Weed Mat Trial, 2007
	1, 2, 3, 4, 5, 8	Enhanced Biological Control of Yellow Starthistle, 2007
	1, 2, 3, 4, 6, 7	Exploring Alternative Methods for Vegetation Control, 2003
	1, 2, 3, 4	Biological Control of Cape Ivy, 2002
	1, 2, 3, 4 ,5	International Broom Initiative, 2002
	1, 2, 3, 4	Biological Control of Weeds, 2002
	1, 2, 3, 4	Biological Control of Yellow Starthistle, Tri-Annual Report, 1998
	1, 2, 3, 4, 5	Integrated Pest Management Plan for Control of Eucalyptus Longhorned Borer, 1994
M	1, 2, 3, 6, 7	Best Practices of Weed Control (2007 TAP)
M	2, 3, 4, 5, 6	Environmentally Friendly Herbicides (2007 TAP)
L	1, 4, 5, 6	Impacts of weeds on neighboring lands such as agricultural communities and sensitive habitats (2007 TAP)

Legend	
	Ongoing Research
	Completed Research
	Additional Research Needed
H	High Priority
M	Medium Priority
L	Low Priority

Design and Planning

LAP Research Projects

Context Sensitive Solutions

Goal: Protect and enhance the environment and quality of life through a collaborative approach involving all stakeholders.

Objectives

1. Develop non-motorized transportation expertise
2. Improve connectivity of bike/ped infrastructure
3. Comply with ADA requirements and DIB 82-03
4. Facilitate relationship building with internal and external stakeholders
5. Prevent project delays, re-design and cost over-runs
6. Quantify economic benefits to communities
7. Develop design flexibility guidance
8. Implement corridor master plans
9. Quantify economic value of pollution removal services provided by landscaping

Priority	Objective	Research Project
	1, 2, 4	Effects of Transportation Corridor Features on Driver and Pedestrian Behavior, 2009
	2	Safety Evaluation of the Gateway Monument Demonstration Project, 2009
H	6, 7, 8, 9	Development of Prototype Sustainable Landscape (2007 TAP)

Aesthetics

Goal: Protect and improve aesthetic values visible from and to transportation facilities

Objectives

1. Improve appearance and safety of roadside appurtenances
2. Protect scenic quality of transportation corridors
3. Quantify the value of aesthetics
4. Graffiti abatement

Priority	Objective	Research Project
	1, 2	Aesthetic/Low Maintenance Guardrail System, 2011
	1, 2	Low Profile Barrier Crash Testing, 9-08 DRI off-cycle funding
	1, 2	Weathering Steel Guardrail, 2010
	1, 2	California Highway Barrier Aesthetics Report, 2002
H	1, 2	Submitted 2010 NCHRP Caltrans Visual Impact Assessment (2008 LAP)
M	3	Quantify the Value of Aesthetics (2007 TAP)
L	4	Best Practices for Graffiti Abatement (2007 TAP)

Safety

Goal: Improve traveler and worker safety through design

Objectives

1. Reduce maintenance worker exposure to motorized traffic
2. Reduce conflicts with vehicles and roadside appurtenances
3. Minimize fire hazards
4. Improve security at Safety Roadside Rest Areas (SRRAs)
5. Improve traveler stopping opportunities

Priority	Objective	Research Project
	2	Safety Evaluation of the Gateway Monument Demonstration Project, 2009
	1, 4, 5	Public/Private Partnership Strategies for SRRAs, 2008
	1, 3, 5	Accidents Involving Driver Fatigue, 2008
H	5	Update SRRA Master Plan, Submitted for 08/09 DRI off-cycle funding (2008 LAP)
M	3	Evaluation of Existing Fire Control Strategies (2007 TAP)
L	3	Best Practices of Fire Ladder Management (2007 TAP)

Legend	
	Ongoing Research
	Completed Research
	Additonal Research Needed
H	High Priority
M	Medium Priority
L	Low Priority

Landscape

LAP Research Projects

Highway Planting

Goal: Improve planting and revegetation success

Objectives

1.Establish desirable vegetation in the R/W
2. Comply with permit requirements for revegetation and mitigation
3. Develop sustainable landscapes

Priority	Objective	Research Project
	1, 2, 3	Legume Seed Inoculation for Highway Planting in California, 2006
	1, 2	Native Shrub Germination Relative to Compost Type, Application Method and Layer Depth, 2005
	1, 2, 3	Competitive Growth Characteristics of Native and Exotic Grasses, 1998
	1, 2, 3	Effectiveness of Tap-Root Bags in Establishing Oak, 1995
H	1, 3	Submitted 2010 NCHRP, Trees and Environmental Quality (2008 LAP)

Irrigation

Goal: Conserve water and reduce irrigation life-cycle costs

Objectives

1. Reduce maintenance of irrigation systems
2. Reduce need for supplemental irrigation
3. Improve irrigation efficiency and reliability
4. Reduce irrigation construction costs

Priority	Objective	Research Project
	2, 4	Providing Adequate Moisture for Plant Establishment under Reduced Irrigation, 2008
M	1, 2, 3	Best Practices for Irrigation Management Strategies During Droughts (2007 TAP)
M	1, 3, 4	Evaluation of RICS Effectiveness (2007 TAP)
M	3	Evaluation of Caltrans Reclaimed Water Use (2007 TAP)

Landscape Construction

Goal: Improve landscape construction methods and reduce construction costs

Objectives

1. Improve cost estimating practices
2. Reduce contract change orders
3. Incorporate recycled products
4. Reduce construction worker exposure to traffic
5. Insure timely project completion
6. Increase bidder interest in projects

Objective	Research Project
	Additional research is needed to meet all objectives.

Legend	
	Ongoing Research
	Completed Research
	Additonal Research Needed
H	High Priority
M	Medium Priority
L	Low Priority

Funding Cycle Dates for LAP Research

NCHRP

September, submit new NCHRP project problem statements for funding in next FY
(Use NCHRP Problem Statement Outline format)
January, Evaluate NCHRP problem statements (submitted last Sept.). Prioritize for Rick Land

DRI

February, LA/EC TAP submit new task proposals to PSC review for funding in next FY
March, PSC review and submit recommended new tasks to RDAC for funding in next FY
April, RDAC makes recommendations to RDSC
May, RDSC approve new tasks for funding in next FY
September, submit task proposals to RDSC for urgent (off-cycle) funding in current FY

DEA Stormwater Program

Ongoing, Stormwater Program purpose and need statements for potential research

LAP Research Priority Rankings

High:

Submitted 2010 NCHRP, Caltrans Green Infrastructure
Submitted 2010 NCHRP, Roadside Sustainability Synthesis Study
Submitted 2010 NCHRP, Trees and Environmental Quality
Submitted 2010 NCHRP Caltrans Visual Impact Assessment
Best Practices for Irrigation Management Strategies During Droughts (2007 LA/EC TAP)
Development of Prototype Sustainable Landscape (2007 LA/EC TAP)
Low Impact Development strategies (2008 LA/EC LAP)
Improve Soil Evaluation Practices (2008 LA/EC LAP)

Medium:

Development of a Trash Fence (2007 LA/EC TAP)
Quantify the Value of Aesthetics (2007 LA/EC TAP)
Evaluation of Fire Control Design Strategies (2007 LA/EC TAP)
Evaluation of RICS Effectiveness (2007 LA/EC TAP)

Low:

Best Practices for Graffiti Avoidance (2007 LA/EC TAP)
Best Practices of Fire Ladder Management (2007 LA/EC TAP)